



ISTITUTO NAZIONALE
DI OCEANOGRAFIA E DI GEOFISICA SPERIMENTALE



OGS improvements in 2012 in running the Northeastern Italy Seismic Network: the Ferrara VBB borehole seismic station

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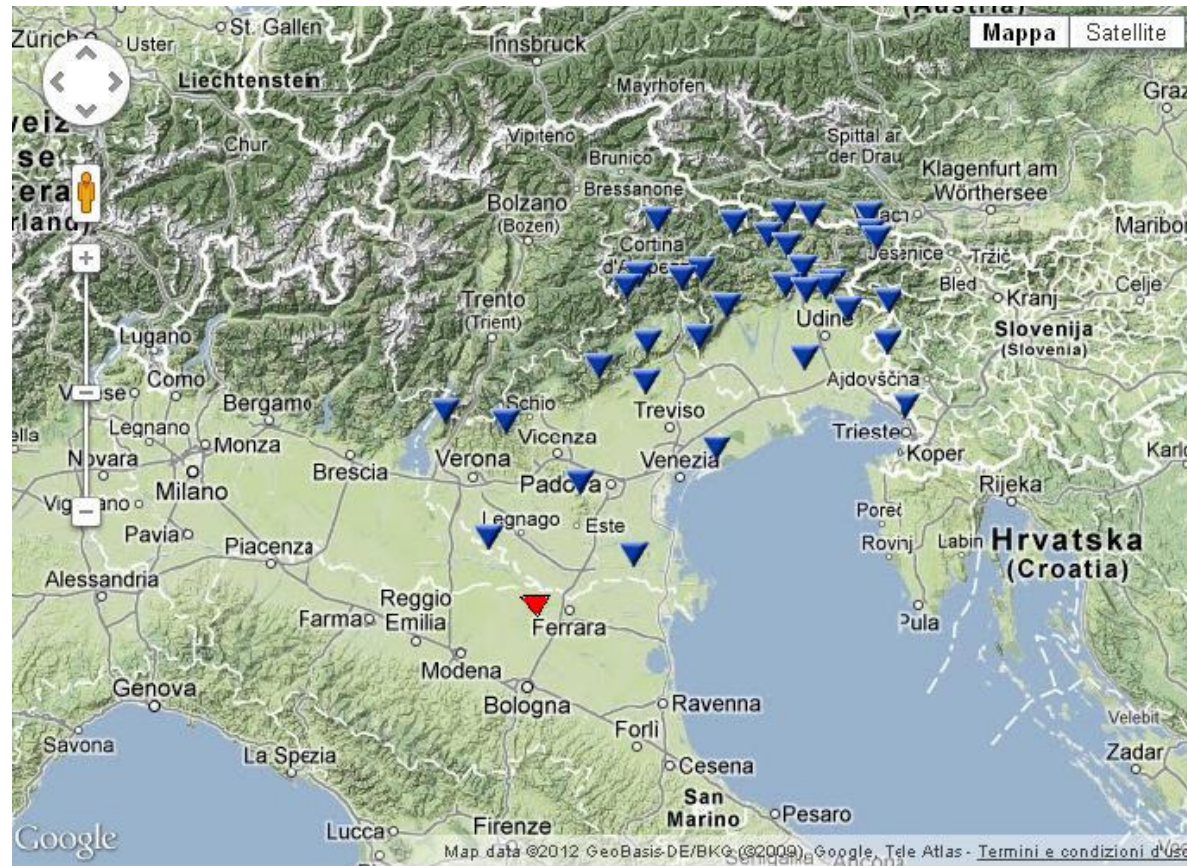


**Istituto Nazionale di
Geofisica e Vulcanologia**



Città Patrimonio dell'Umanità

NI network (FERB in red)



FERB instrumentation

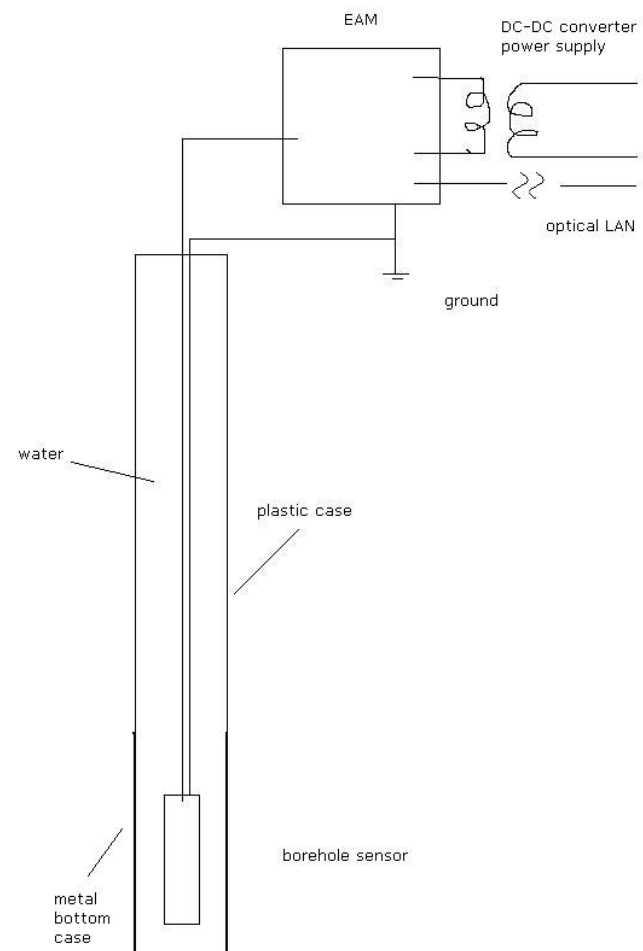


- Guralp CMG-3TB 360sec velocimeter
- Guralp CMG-5TB accelerometer
- Guralp DM24-borehole 6-chans digitizer
- Guralp EAM acq. mod. (80MB HD, SEED format, SeedLink, Scream & web servers)
- GPRS router

FERB borehole



FERB schematics



Guralp EAM web mon.

The screenshot displays the Guralp EAM web monitoring interface in Mozilla Firefox. The browser address bar shows the URL `crs-fe01.dyndns.org/cgi-bin/auth/index.cgi`. The page is titled "System status" and features a navigation menu on the left and a main content area.

Main menu

- FERB**
 - Summary
 - System status
 - User: root
 - Change password
 - User logout
 - Control
 - Digital I/O
 - Reboot
 - Services
 - Instruments
 - Port A instrument NI-FERB
- Tools**
 - Environment logs
 - Extract Mini-SEED records
 - Firmware
 - GCF audit log viewer
 - GDI channels display
 - Storage and recording
- Instruments**
 - FORTH terminal access
- Configuration**
 - All options
 - Hostname
 - Save/Restore
 - Users
 - Data handling**
 - Serial ports
 - Services
 - Storage and recording
 - Tasks
 - Timing
 - Triggering
- Instruments**
 - Port A instrument NI-FERB
- Networking**
 - Interfaces
 - Mail

System status

Home → Status

System status

- GCF in: Port A
- Scream server (GCF network sender)
- Default data transport daemon
- System gdi-link transmitter
- GCF compressor: Default instance
- Mini-SEED compressor: Default instance
- NI-FERB
- NTP
- SEEDlink network server (instance 1)
- Storage
- Linux system

Jump to top

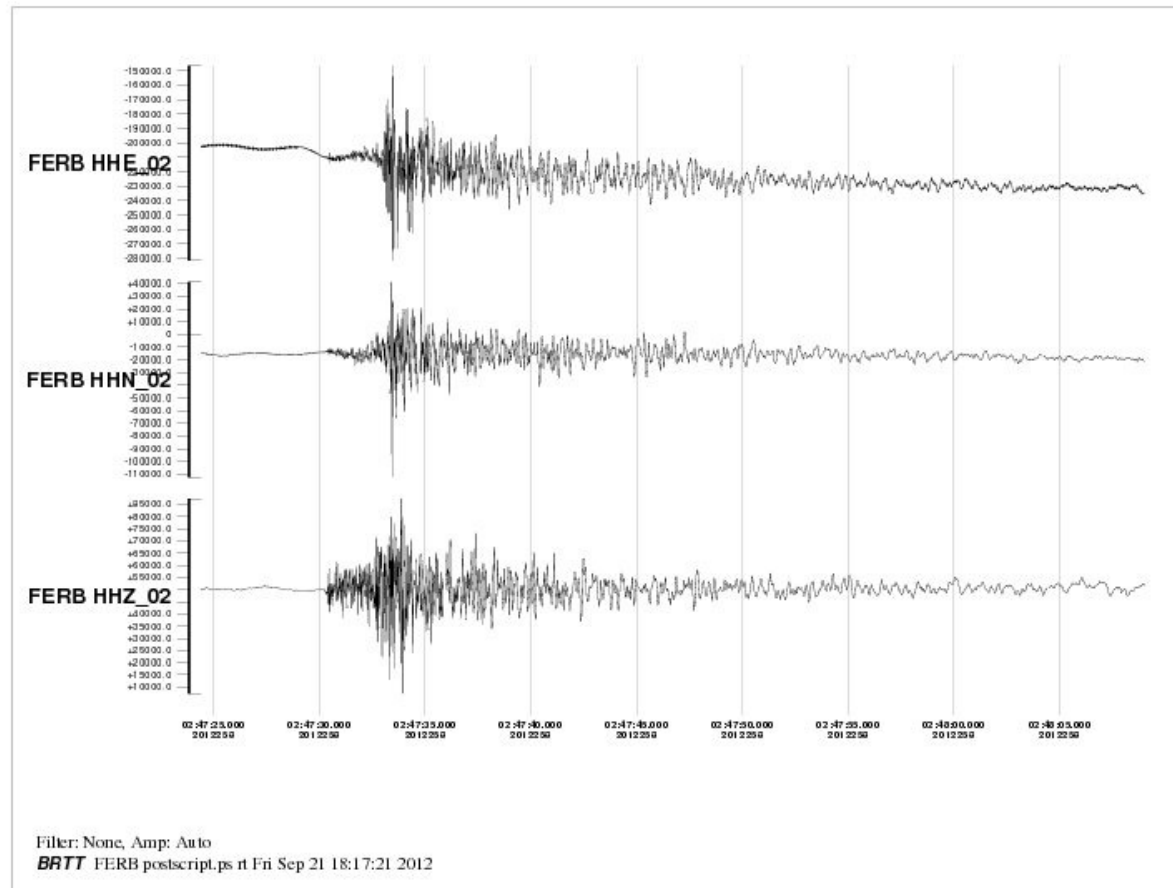
NI-FERB — 80%

- Clock locked: false — 97%
- Clock difference: 12.00µs — 97%
- Clock last locked time: 2012-09-21T17:12Z — 97%
- GPS fix: 2D fix — 80%
- GPS latitude: 44.901488°
- GPS longitude: 11.540056°
- GPS elevation: 9.000m
- Calibrating:
- Z mass position: 0.4% — status 99%
- N mass position: 9.9% — status 90%
- E mass position: 0.3% — status 99%

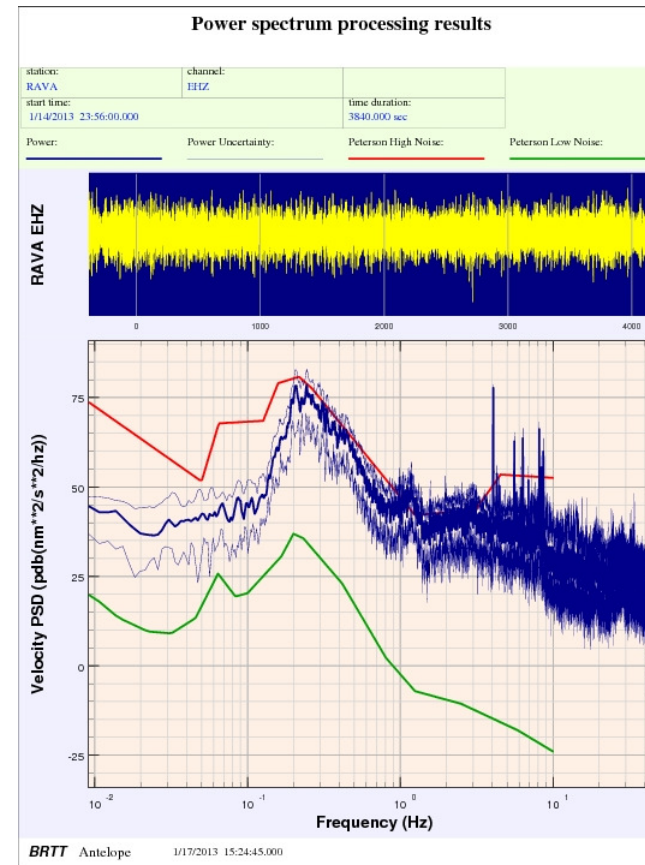
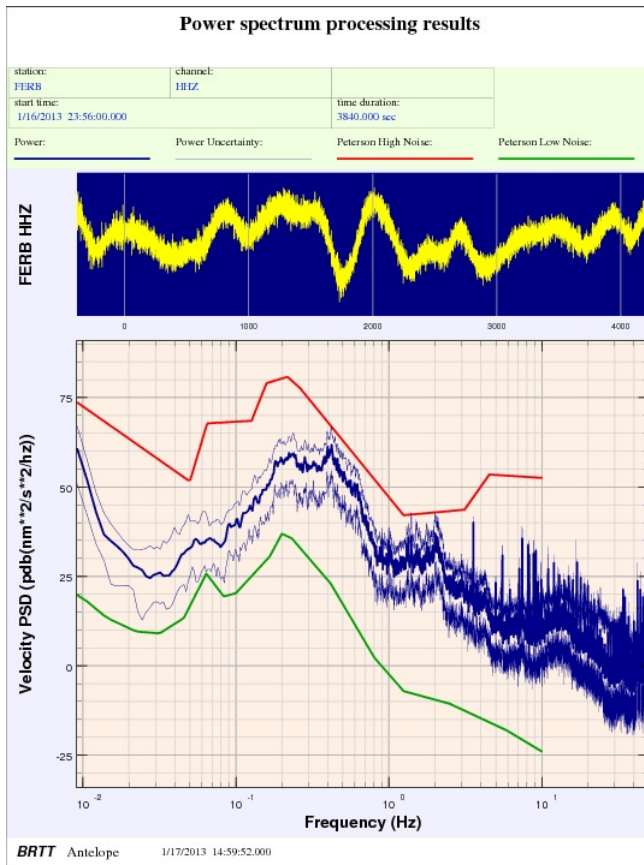
View saved XML snapshot | Download snapshot as XML | Show hidden values

Generated at 2012-09-21T17:16:54Z by xmlstatus.cgi. Portions of output copyright © 2012, Guralp Systems Ltd..

local event (ML=3.0 D=15km)



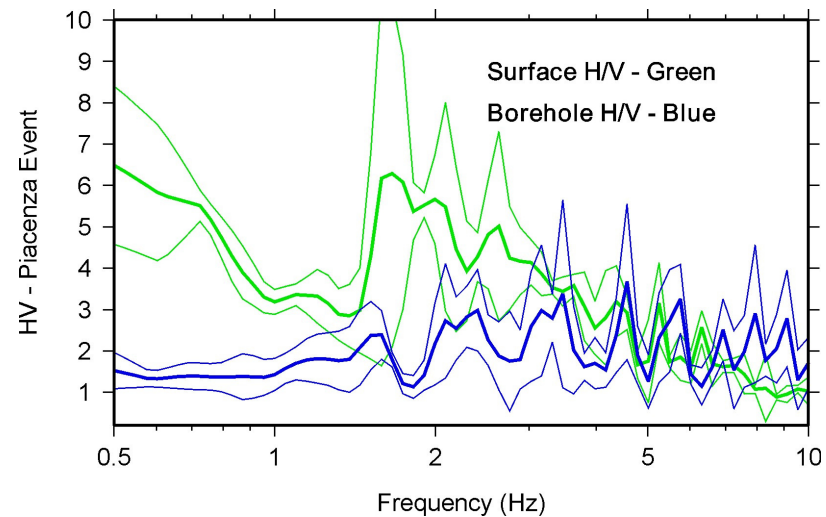
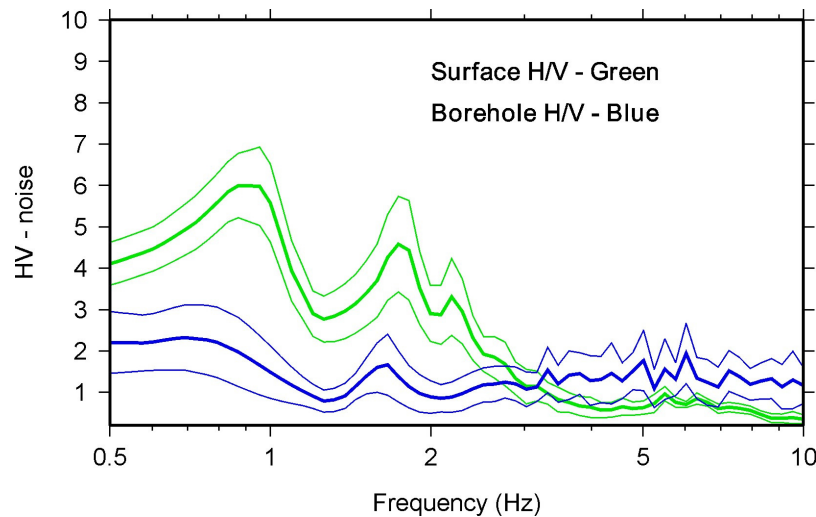
FERB PSD: 95s-40Hz -25dB!



Surface/borehole H/V

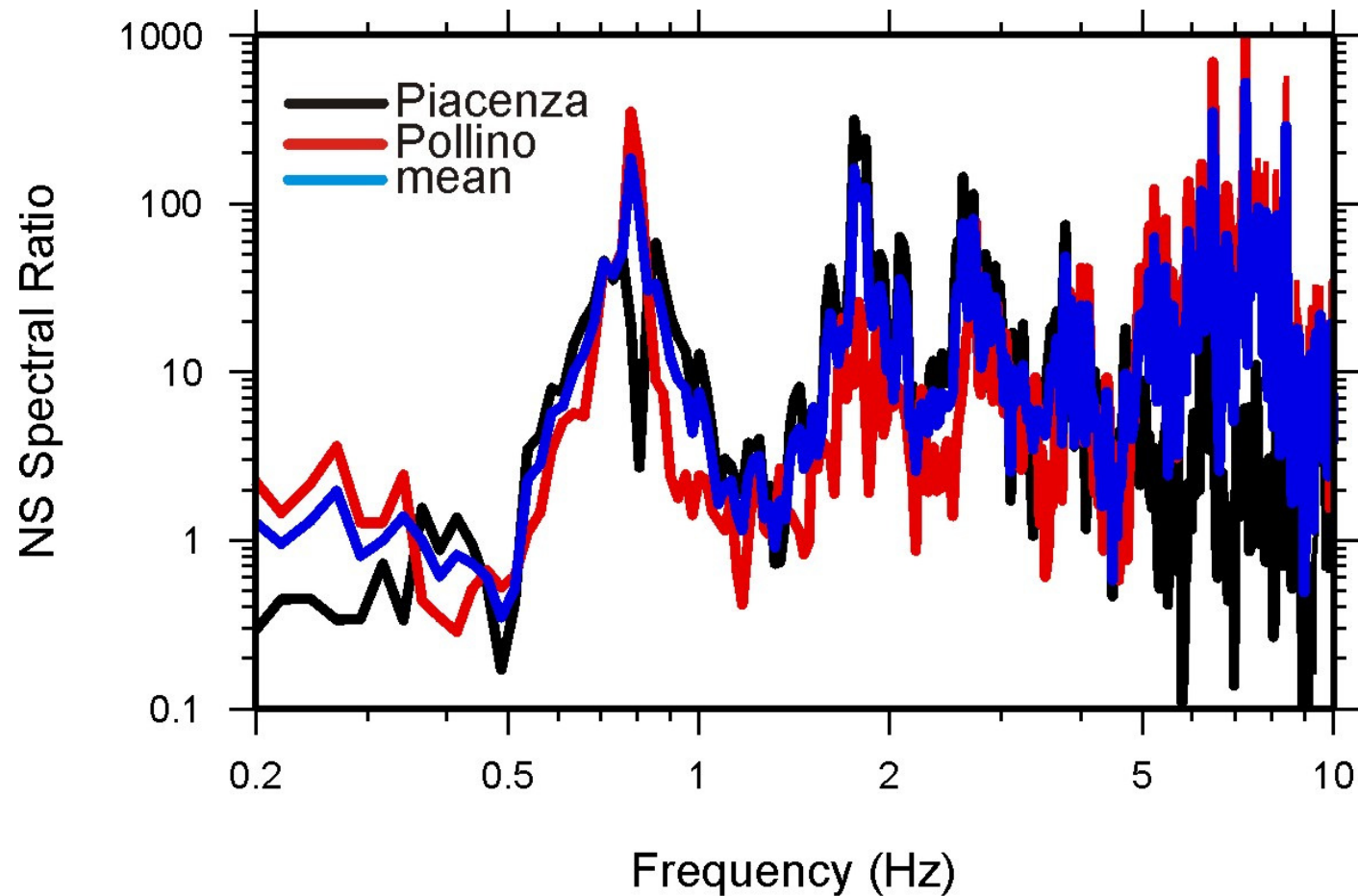
noise

$M_L=4.6$ $\Delta=140\text{Km}$



$\sim 0.8\text{Hz}$ & 1.8Hz amplification peaks
on horizontals at surface

Surface/borehole H/H



0.8Hz
1.8Hz
horiz.
ampl.
peaks
@surf.

Credits

- Lorella Dall'Olio (Comune di Ferrara)
- Nasser Abu Zeid (Università di Ferrara)
- Marco Mucciarelli, Michele Bertoni and Elvio Del Negro (OGS)
- Antonio Rovelli, Massimo Cocco and Alessandro Amato (INGV)

References

- Bragato, P.L., Di Bartolomeo, P. , Pesaresi, D. , Plasencia Linares, M.P. and Saraò, A.: Acquiring, archiving, analyzing and exchanging seismic data in real time at the Seismological Research Center of the OGS in Italy, *Annals of Geophysics*, 54(1), 67-75, doi: 10.4401/ag-4958, 2011.
- Cocco, M., Ardizzoni, F., Azzara, R.M., Dall'Olio, L., Delladio, A., Di Bona, M., Malagnini, L., Margheriti, L. and Nardi, A.: Broadband waveforms and site effects at a borehole seismometer in the Po alluvial basin (Italy), *Annals of Geophysics*, 44(1), 137-154, 2001.
- Margheriti, L., Azzara, R.M., Cocco, M., Delladio, A. and Nardi, A.: Analysis of Borehole broadband recordings: Test site in the Po Basin, Northern Italy, *BSSA*, 90(6), 1454-1463, 2000.
- Pesaresi, D., Dall'Olio, L., Rovelli, A., Romanelli, M., Barnaba, C. and Abu Zeid, N.: Installation of a very broad band borehole seismic station in Ferrara (Emilia), *Atti del 31° Convegno Nazionale GNGTS*, 2, 69-75, ISBN 978-88-902101-2-9, 2012.